VLAN Configuration

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Chapter 1 VLAN Configuration

1.1 VLAN Introduction

The virtual local area network (VLAN) is an exchange network which logically groups the devices in LAN. IEEE issued the IEEE 802.1Q standard in 1999 for realizing the VLAN standard. The VLAN technology can divide a physical LAN logic address into different broadcast domains. Each VLAN has a group of devices which have the same demands but the same attributes with those on the physical LAN. Because it is a logical group, the devices in a same VLAN can be in different physical spaces. The broadcast/unicast flow within a VLAN cannot be forwarded to other VLANs. Such advantages as flow control, low device investment, easy network management and high network security, hence, are obtained.

- Support port-based VLAN
- Support 802.1Q relay mode
- Support the access port

The port-based VLAN is to classify the port into a subset of VLAN supported by the OLT. If the VLAN subnet includes only one VLAN, the port is the access port; if the VLAN subnet has multiple VLANs, the port is a trunk port; there is a default VLAN among these VLANs, which is the native VLAN of the port and whose ID is PVID.

Support VLAN range control

The vlan-allowed parameter is used to control the VLAN range; the vlan-untagged parameter is used to control the transmission of the untagged VLAN packet from the port to the corresponding VLAN.

1.2 VLAN Configuration Task List

- Adding/Deleting VLAN
- Configuring the OLT Port
- Creating/Deleting the VLAN Interface
- Monitoring the VLAN Configuration and VLAN State
- Configuring VLAN Translation Mode and Items on a Port

1.3 VLAN Configuration Task

1.3.1 Adding/Deleting VLAN

VLAN is grouped according to different functions, project groups or different applications, not based on the physical locations of these users. VLAN has the similar attributes as the physical LAN, but can group terminals in different physical LANs into a same VLAN. One VLAN can have multiple ports, while all unicast/broadcast/multicast packets can be forwarded or diffused to the terminals through a same VLAN. Each VLAN is a logical network; to forward one packet to another VLAN, the routes or bridge must be used to forward it.

Run the following commands to configure VLAN:

Command	Purpose
vlan *vlan-id*	Enters the VLAN configuration mode.
name *str*	Name in the VLAN configuration mode
Exit	Exits the VLAN configuration mode and creates the VLAN.
vlan *vlan-range*	Creates multiple VLANs simultaneously.
no vlan *vlan-id* | *vlan-range*	Deletes one or multiple VLANs.

You can use the GVRP protocol to dynamically add or delete the VLAN.

1.3.2 Configuring the OLT Port

The OLT's port supports the following modes: the access mode, the relay mode, the VLAN tunnel mode, the VLAN translating tunnel mode and the VLAN tunnel uplink mode.

- The access mode indicates that the port belongs to just one VLAN; only the untagged Ethernet frame can be transmitted and received.
- The relay mode indicates that the port connects other OLTs and the tagged Ethernet frame can be transmitted and received.
- The VLAN translating tunnel mode is a sub mode based on the relay mode. The port looks up the VLAN translation table according to the VLAN tag of received packets to obtain corresponding SPVLAN, and then the switching chip replaces the original tag with SPVLAN or adds the SPVLAN tag to the outside layer of the original tag. When the packets is forwarded out of the port, the SPVLAN will be replaced by the original tag or the SPVLAN tag will be removed mandatorily. Hence, the OLT omits different VLAN partitions that access the network, and then passes them without change to the other subnet that connects the other port of the same client, realizing transparent transmission.
- The VLAN tunnel uplink mode is a sub mode based on the relay mode. The SPVLAN should be set when packets are forwarded out of the port. When the packets are received by the port, their TPIDs will be checked. If difference occurs or they are untagged packets, the SPVLAN tag which contains their own TPID will be added to them as their outer-layer tag. When the packets are received by the port, their TPIDs will be checked. If difference occurs or they are untagged packets, the SPVLAN tag which contains their own TPID will be added to them as their outer-layer tag. On GPON OLT, the uplink port works on VLAN tunnel uplink mode by default.

Each port has a default VLAN and PVID; all VLAN-untagged data received on the port belongs to the packets of the VLAN.

The relay mode can group the port to multiple VLANs; at the same time, you can configure the type of to-be-forwarded packets and the quantity of the corresponding VLANs.

The following commands will be used when you configure the OLT port.

Command	Purpose
switchport pvid *vlan-id*	Configuring the OLT PVID.
switchport mode {access | trunk | dot1q-tunnel-uplink *tpid* **| dot1q-translating-tunnel}**	Configures the interface mode of the OLT.
switchport trunk vlan-allowed …	Configuring the VLAN range of the OLT's interface.
switchport trunk vlan-untagged …	Configures the untagged VLAN ranges of the OLT's port.

1.3.3 Creating/Deleting the VLAN Interface

To realize network management or layer-3 routing, you need create a VLAN interface which can be used for designating the IP address and mask of the interface. Run the following command to configure the VLAN interface.

Command	Purpose
[no] interface vlan *vlan-id*	Creates or deletes a VLAN interface.

1.3.4 Monitoring the VLAN Configuration and VLAN State

To monitor VLAN configuration and VLAN's state, run the following command in EXEC mode:

Command	Purpose
show vlan [id *vlan-id* **| interface** *intf-id* **dot1q-translating-tunnel** *intf-id* **| flat-translation-table]**	Displays the configuration and state of VLAN or Dot1Q tunnel.
show interface vlan *x*	Displays the state of the VLAN interface or that of the supervlan interface.

1.3.5 Configuring VLAN Translation Mode and Items on a Port

Both the VLAN translating mode and the VLAN translating items validate in dot1q-translating-tunnel mode after they are configured. The translation modes fall into two kinds: the Flat mode and the QinQ mode. In Flat mode, the CLAN tag of packets which are received by the dot1q-translating-tunnel downlink port will be used as an index to look up the VLAN translating list. The CVLAN will be replaced by detected SPVLANs; when the packets are forwarded out of the port, the SPVLAN will then be replaced by CVLAN. In QinQ mode, the CLAN tag of packets which are received by the dot1q-translating-tunnel downlink port will be used as an index to look up the VLAN translating list and then the detected SPVLANs will form into SPVLAN tag to be added to the outside of CVLAN tag; when the packets are forwarded out of the port, the SPVLAN

tag will then be removed. The default VLAN translating mode on a port is QinQ.

When the VLAN translating items are configured on a port, only the mapping between CVLAN and SPVLAN can be configured in Flat mode. The multiple-to-one mapping between CVLAN and SPVLAN can be configured in QinQ mode.

The command to configure the VLAN translation mode and translation items is shown in the following table:

Command	Purpose
switchport dot1q-translating-tunnel mode qinq translate {*oldvlanid* **|** *oldvlanlist***}** *newvlan* **[***priority***]**	Configures the VLAN translation mode QinQ and translation item.
switchport dot1q-translating-tunnel mode flat translate *oldvlanid newvlan* **[***priority***]**	Configures the VLAN translation mode Flat and translation item.

Appendix A Abbreviations

Abbrev.	Full Name	Chinese Name
VPN	Virtual Private Network	Virtual Private Network
TPID	Tag Protocol Identifier	Tag Protocol Identifier
QoS	Quality of Service	QoS
P	provider bridged network core	provider bridged network core
PE	provider bridged network edge	provider bridged network edge
CE	customer network edge	customer network edge
UNI	user-network interface	user-network interface
NNI	network-network interface	network-network interface
CVLAN	Customer VLAN	Customer VLAN
SPVLAN	Service provider VLAN	Service provider VLAN